The Effects of Aspirin and Acetaminophen on the GI and Liver Using the "Body on the Chip" Device

An Honors Thesis (HONR 499)

by

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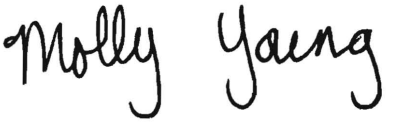

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Abstract

There is a calling for the creation of a device that can mimic the human body in vitro for use in drug trials. The "Body on the Chip" is a name of an apparatus that functions as prototype to model the human body in a 3D fashion. Our model is able to house multiple organ chambers in one device with flow between those chambers. To test the functionality of our "Body on a Chip" device, the toxic effects of aspirin and acetaminophen on the GI and liver were studied. Analysis included staining for viability and P450 activity was measured for metabolism. Viability was calculated using Image J and using the one-way ANOVA and two-sample t statistical tests. P450 was measured with a commercially available kit and luminescence. It was found that the GI had a better viability than liver after a 24 hour exposure to acetaminophen (p-value=0.001) and the GI had a better viability than liver when after a 24 hour exposure to aspirin (p-value=0.001). The GI P450 activity was higher than the liver P450 activity after aspirin exposure (p-value=0.001) and there was no significant difference between P450 activity after acetaminophen exposure. While aspirin and acetaminophen can cause GI and liver damage, the results of this study yield the conclusion that the liver is more sensitive to drug induced toxicity when compared to the GI.

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